

DESCRIPTION**COUPLING APPARATUS AND AN APPLICATION FOR IT****5 Technical Field**

The invention relates to a coupling apparatus according to the precharacterizing clause of Claim 1, and to an application for it. Such coupling apparatuses
10 are used for coupling electrical equipment items to a power cable, and can be used, in particular, for injecting and outputting, for example, radio-frequency signals, for transmitting information via power distribution networks.

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Prior Art

It is known for messages to be transmitted via power supply networks. This is done by injecting and
20 outputting radio-frequency signals capacitively (WO-A-95/29 537) however, this necessitates installations which can be fitted only when the power is switched off, thus involving considerable efforts and costs.

25 Description of the Invention

In contrast, the invention is based on the object of specifying a coupling apparatus which can be fitted to a power cable easily and quickly and
30 essentially safely, requiring the power to be switched off in advance [sic]. Further advantages are that the coupling apparatus has a simple design, is small, and can be produced easily and cheaply.

The coupling apparatus according to the
35 invention is highly suitable for outputting and injecting signals for the transmission of information via the power supply network and can be used, in particular, in local network transformer stations,

distribution points and domestic terminal boxes in a low-voltage power supply network. Particularly if the coupling apparatus is fitted to a phase conductor close to an opening-out point of the power cable, only minor
5 radiated emissions, reflections and attenuation occur, so that even signals with a relatively low amplitude are adequate for information transmission.

Brief Description of the Drawings

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The invention will be explained in more detail in the following text with reference to the drawing, which shows only one exemplary embodiment, and in which:

15 Figure 1 shows a longitudinal section through a coupling apparatus according to the invention, and

Figure 2 shows, schematically, a coupling apparatus according to the invention, fitted to a phase
20 conductor of a power cable.

Ways to carry out the Invention

As is best seen in Figure 1, the coupling
25 apparatus according to the invention has an elongated, roughly cuboid housing 1 composed of electrically insulating material, preferably plastic, with (in the vicinity of an upper end) an opening 2 which is arranged on a front face and through which a needle 3
30 projects to the outside, transversely with respect to the longitudinal direction of the housing 1. The needle 3 is firmly anchored in a holder 4, which is mounted in the housing 1 such as that it can be moved and rotated. The holder 4 has an external thread which engages in an
35 internal thread in a bearing sleeve 5, which is firmly connected to a screw 6. On the outside, it is provided with a slot for a screwdriver to engage in. The needle 3, the holder 4 and the bearing sleeve 5 are composed of electrically conductive material, preferably steel,

while the screw 6 is composed of electrically insulating material, preferably plastic.

The bearing sleeve 5 is connected to a contact piece 7 which is arranged at the upper end of an elongated cavity 8 in the interior of the housing 1. At the lower end, the cavity 8 is surrounded by a contact sleeve 9, to whose outside an insulated cable 10 is electrically conductively connected, which cable 10 is passed out of the housing 1 at its lower end and forms a connection for, for example, a transmitting and receiving unit.

An overcurrent protection device 11 is arranged in the cavity 8, has a first contact 12 which rests against the contact piece 7, and has a second contact 13 which is mounted in the contact sleeve 9 such that it can slide and makes electrically conductive contact on its inside both directly and via a compression string 14 which is supported on the lower end of the contact sleeve 9. The compression spring 14 applies a force directed upwards to the overcurrent protection device 11 and thus ensures adequate contact pressure between its first contact 12 and the contact piece 7. The needle 3 is thus connected to the cable 10 via the holder 4, the bearing sleeve 5, the contact piece 7, the overcurrent protection device 11 and the contact sleeve 9. The housing 1 has two transverse grooves 15, 16 separated in the longitudinal direction on the rear face.

In a rest position, the needle 3 is pulled back, so that it does not project at all, or projects only to a minor extent, out of the opening 2. In this condition, as is shown in Figure 2, the coupling apparatus can be conveniently attached to a phase conductor 17 of a power cable 18 which is part of a power supply network, by placing two cable ties 19, 20 around the phase conductor 17 and the coupling apparatus, to be precise in such a manner that they lie in the transverse grooves 15, 16. A screwdriver is then fitted to the screws 6, and the holder 4 is pushed

forwards by turning the screwdriver to the right, during which process the bearing sleeve 5 is also rotated, so that the needle 3 pierces the insulation of the phase conductor 17 until it reaches its operating position, in which the tip of the needle 3 is in contact with the surface of the phase conductor 17. This produces an electrically conductive connection between the phase conductor 17 and the cable 10. The contact area between the tip of the needle 3 and the phase conductor 17 is admittedly small, but is adequate since only small currents are intended to flow.

Thanks to the insulating housing 1 and the fact that the screw 6 is likewise composed of insulating material, the coupling apparatus can be fitted largely safely. As the only uninsulated part, the needle 3 is electrically conductively connected to the phase conductor 17. However, since the opening 2 in the housing 1 rests directly on the insulation of the phase conductor, part of the needle is inside the housing 1 and the other part is within the insulation, and is thus not accessible.

An equipment item which is connected to the cable 10, for example a transmitting and receiving unit, is thus coupled via the coupling apparatus to the phase conductor 17 and can be used to transmit and receive information transmitted via the power supply network. The overcurrent protection device 11 protects it against damage from overcurrents. With regard to the quality of transmission, it is advantageous if the coupling apparatus is fitted to a phase conductor 17 in the vicinity of the opening-out point 21 of the power cable 18, up to which point the power cable 18 is surrounded and held together by overall insulation. Owing to the still homogenous field distribution there, radiated emissions, reflections and attenuation of the injected signals occur only to a minor extent, and the injecting and outputting efficiency is particularly high.

If the coupling apparatus is no longer required at the point at which it is fitted, then it can be removed without any difficulty, once again without having to switch off the power, once the needle 3 has
5 been pulled back to the rest position by turning the screw 6 to the left, and by cutting through the cable ties 19, 20. The minor damage to the insulation of the phase conductor 17 caused by the penetration of the needle 3 is inconsequential.

List of reference symbols

	1	Housing
	2	Opening
5	3	Needle
	4	Holder
	5	Bearing sleeve
	6	Screw
	7	Contact piece
10	8	Cavity
	9	Contact sleeve
	10	Cable
	11	Overcurrent protection device
	12	First contact
15	13	Second contact
	14	Compression spring
	15, 16	Transverse grooves
	17	Phase conductor
	18	Power cable
20	19, 20	Cable ties
	21	Opening-out point



PATENT CLAIMS

1. Coupling apparatus for electrical coupling of equipment items to an individual conductor (which is surrounded by insulation) of a power cable (18), having at least one connection for an equipment item, **characterized in that** the said apparatus has a projecting needle (3) for piercing the insulation, which is electrically conductively connected to the connection.
2. Coupling apparatus according to Claim 1, **characterized in that** the said apparatus has a housing (1) with an opening (2) in which the needle (3) is arranged.
3. Coupling apparatus according to Claim 2, **characterized in that** the needle (3) can be moved between an operating position, in which it projects out of the housing (1), and a rest position, in which it does not project, or does not project as far, out of the housing (1).
4. Coupling apparatus according to Claim 3, **characterized in that** the needle (3) is anchored in a holder (4) which can be moved in a bearing sleeve (5), which is arranged in the housing (1), by means of a screw (6) which is mounted in the housing (1) and can be operated from the outside.
5. Coupling apparatus according to Claim 4, **characterized in that** the electrically conductive connection of the needle (3) to the connection is produced via the holder (4) and the bearing sleeve (5), and at least that part of the screw (6) which is accessible from the outside is composed of electrically insulating material.
6. Coupling apparatus according to one of Claims 1 to 5, **characterized in that** an overcurrent protection device (11) is located between the needle (3) and the connection.
7. Coupling apparatus according to one of Claims 2 to 5 and Claim 6, **characterized in that** the overcurrent



protection device (11) is arranged in the housing (1), and is electrically conductively connected to the connection via a contact sleeve (9), in which it is mounted such that it can slide.

5 8. Coupling apparatus according to one of Claims 2 to 7, **characterized in that** the housing (1) is designed to be elongated and, on a rear face, has two transverse grooves (15, 16) (which are separated in the longitudinal direction) for accommodating cable ties
10 (19, 20), while the opening (2) is arranged on a front face, in particular on an end region, of the housing (1).

9. Use of the coupling device according to one of Claims 1 to 8 for injecting signals, which are used for
15 information transmission, into a power supply network.

10. Use according to Claim 9, **characterized in that** the coupling device is fitted to one of the insulated phase conductors (17), immediately adjacent to an opening-out point (21) of a power cable (18).

This Sheet Has Been Replaced

